

A NEW SPECIES OF MENTZELIA SECTION BARTONIA (LOASACEAE)

FROM WESTERN NEVADA

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Abstract

A new species, Mentzelia candalariae, is described from west-central Nevada. It appears to be most closely related to M. pterosperma, M. pumila, and M. albescens.

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Several years ago we examined all of the specimens of Mentzelia Section Bartonia in United States herbaria at which time we set aside a few specimens that had been collected by W. H. Shockley in 1882 and 1888 near the now abandoned mining town of Candelaria, Mineral County, Nevada. These collections were thought to represent an undescribed element in Section Bartonia and were referred to in various reports and letters as the "Candelaria" population. Subsequent field studies, collections, cultivation in the experimental garden, and interspecific hybridizations of these plants convinced us of their uniqueness. Now the excellent collections by Arnold Tiehm of Reno, Nevada, have provided abundant material of the species, extending its known range and showing both its variation and distinctiveness.

Mentzelia candalariae Thompson & Prigge, sp. nov.

A M. pterosperma recedens sed petalis 5, 6-10 mm longis 2-4 mm latis acuminatis sepalis parum longioribus, staminibus petaloideis nullis, alis seminum conspicuis, 0.6 mm latis cellulis testarum parietibus radialibus rectis vel leviter undulatis.

Herbaceous perennial, stems 15-30 (-48) cm tall, erect, single or several from base, white, pubescent with glochidiate hairs and scattered pointed hairs; rosette leaves oblanceolate to obovate, irregularly and bluntly lobed or sinuate, lower cauline leaves linear-lanceolate, 2-10 cm long, 1-2 cm wide, irregularly dentate, shallowly lobed or nearly entire, upper leaves similar, lower leaf surfaces pubescent with long pointed hairs and smaller glochidiate hairs, upper surfaces less densely pubescent with scattered curved, pointed hairs, leaf margins with glochidiate hairs, bracts at base of or just below the capsules, linear and entire; flowering period May and June, flowers opening in late afternoon; calyx lobes triangular-acuminate, 5-8 mm long; petals 5, yellow, 6-10 mm long, 2-4

mm wide, narrowly lanceolate-acuminate; stamens 2-5 mm long, filaments narrow, the outer 5 dilated to about 1 mm wide, petaloid stamens absent and thus the petals distinct from the stamens; styles 5-7 mm long; capsules cup-shaped to subcylindric, 8-12 (-14) mm long; seeds lenticular, ovate, 2.5-3.5 mm long including the conspicuous wing which is 0.6 mm wide, seed surface light tan to nearly white, colliculate, the radial walls of seed coat cells straight to slightly wavy, center of outer tangential walls raised with 10-15 papillae; chromosome number  $n=11$ ; self-compatible.

Type: USA. Nevada, Mineral County, hillsides 2 mi east of Candelaria, Lat. N  $38^{\circ} 10'$ ; Long.  $118^{\circ} 04' W$ , 5500 ft elev. 5 June 1968, J. Zavortink & H. J. Thompson 3164 (HOLOTYPE: RSA. Photographs: LA, UTC, US, BRY, TEX, UC, RENO).

Paratypes: USA. Nevada. Purshing Co.: foothills of Stillwater Range, NW side of Dixie Valley just N of county line, T25N, R37E, sec. 29, with Atriplex on dark, loose volcanic gravel hillsides, 3800 ft, 24 June 1980, Tiehm 6017 (CAS, RSA). Churchill Co.: Camp Terrill, Lat. N  $39^{\circ} 04'$ ; Long.  $118^{\circ} 42' W$ , Ross 31 (JEPS); NW side of Dixie Valley, W of Boyer Ranch T24N, R36E, sec. 11, only 6 plants seen, light colored steep hillside, 3800 ft, with Atriplex, 20 May 1979, Tiehm 4873 (CAS); Stillwater Range, NW side of Dixie Valley, NNE of Boyer Ranch, T25N, R37E, sec. 32, light colored clayey hillsides, 3800 ft, with Atriplex, 23 June 1980, Tiehm 6000 (CAS, RSA); Hot Springs Mts., 3.5 air mi SE of Desert Peak, T22N, R27E, sec. 25, on steep, light colored clay hills, 4500 ft, 16 June 1983, Tiehm 7916 (CAS). Mineral Co.: Candelaria, Shockley sn, August 1888 (JEPS), Shockley sn in 1882 (GH, JEPS), Shockley sn, July 1888 (DS, NY). Esmeralda Co.: 8 mi SW on Hwy 47 from Blair Junction, T1N, R39E, Neese & White 8817 (BRY); Monte Cristo Range, 2.5 air mi N of Blair Junction, T2N, R38E, sec. 6, barren clay hillsides, 5300 ft, 6 May 1981, Tiehm 6381 (CAS); Montezuma Valley, 1 road mi N of playa on valley floor, 11.5 air mi NW of Goldfield, T1S, R41E, sec. 5, in gravel wash, 4900 ft, with Atriplex and Hymenoclea, 5 May 1981, Tiehm 6353 (CAS); between Montgomery Pass and Columbus Salt Marsh, Eastwood & Howell 9524 (CAS). Nye Co.: Ralston Valley, Hunts Canyon, T8N, R45E, sec. 35, gravelly slope, 6700 ft, 31 July 1978, Goodrich 12056 (BRY); low divide between E & W Stone Cabin Valleys, 42 mi  $57^{\circ}$  from Tonopah, near 1971 Bench Mark of 6225 ft, small outcrops of whitish & grayish tuffaceous sedimentary materials, Lat. N  $38^{\circ} 23' 56''$ , Long.  $116^{\circ} 34' 37'' W$ , 27 June 1979, Goodrich 12987 (LA); 9 mi NW of Tonopah, 4500 ft, T4N, R41E, White & Neese 151 (BRY).

Mentzelia candalariae occurs in western Nevada (Fig. 2) in Shadscale and Sagebrush Zones of the Lahonton Basin and Tonopah floristic sections as they are outlined by Cronquist, et al. (1972). Within these vegetation zones M. candalariae occurs only on sites where the vegetation is broken by topographic or edaphic anomalies such as loose gravel slopes and clay hills. The popula-

tions are thus local and discontinuous. The southern populations occur at elevations between 4500 and 5500 ft while the northern ones are between 3800 and 4500 ft, but notable exceptions are the two collections by Goodrich which occur at 6225 and 6700 ft. No information about associate plants or surrounding vegetation are given by Goodrich but when the two localities are plotted on USGS 1:250,000 topographic map Tonopah, Nevada 1962, they fall outside the green overprint that represents "woods-brushwoods." Thus it appears that these high elevation populations are in Sagebrush and not Juniper Woodland.

We have grown two individuals of M. candelariae in the greenhouse at UCLA from seed collected from the type locality. Chromosomes of one of these plants (3164-1) were observed at metaphase<sub>I</sub> where 11 pairs were observed in several cells, and at anaphase<sub>I</sub> where segregation was 11 and 11. These plants were selfcompatible and autogamous, produced 86% good pollen, and set an average of 50 seeds per capsule. Individual 3164-2 was crossed as the seed parent with M. albescens (Thompson 3549, Alpine, Texas). The M. albescens parent plant, also selfcompatible, had 96% good pollen and set 81 seeds per capsule. Two capsules from the crosspollination formed 29 and 21 seeds. These seeds germinated readily and the four F<sub>1</sub> individuals grown to maturity were intermediate in morphology. For example, the 5 petals of M. candelariae and the 10 petals of M. albescens result in F<sub>1</sub> flowers with 5 petals and 5 petaloid stamens. The F<sub>1</sub> plants are sterile producing an average of 11% good pollen and no seeds. Thus there is no barrier to crossability between M. candelariae and M. albescens and the F<sub>1</sub> hybrid is vigorous but the interspecific exchange of genetic material is blocked by the sterility of the F<sub>1</sub> individuals. Herbarium specimens of these hybrids are deposited at RSA.

The relationship of M. candelariae within Section Bartonia seems to be with a group of species centered around M. pterosperma. As we understand the section it is composed of about 40 species, all occurring in west-central North America with one species, M. albescens, ranging disjunctly to Argentina and Chile. Species groups within Section Bartonia are not perfectly clear but the following characteristics outline several loose species clusters: petal apex (obtuse or acute); petal outer surface (glabrous or pubescent); the whorl within the five petals (5 petals, and the flower thus with 10 petals, or 5 petaloid stamens, or 5 narrow-filament stamens, or 5 narrow staminodia, i.e. filaments without anthers); seed coat cell radial walls (straight, wavy, or sinuate); seed coat cell outer tangential walls raised with (one large, flat projection, or a few flat projections, or a mound of many papillae). Mentzelia candelariae has the following states of these characters: acute, glabrous petals; narrow filament stamens; straight radial walls; tangential walls with 10-15 papillae (Fig. 3). Mentzelia candelariae shares all but two of these character states with M. albescens and M. pumila and all but one with M.

pterosperma. In addition, M. candelariae can be hybridized with M. albescens and all four species are similar in chromosome number,  $n=11$ , and all are self-compatible. In contrast, many other species of the section have either 9 or 10 pairs of chromosomes and are self-incompatible. While M. candelariae fits best in the albescens-pumila-pterosperma group, it has some important differences. M. candelariae differs from M. albescens and M. pumila in the surface of the seed coat cells and differs from these two species and M. pterosperma in having only 5 petals. Thus M. candelariae is most similar to M. pterosperma; differing in having fewer petals and also smaller, less conspicuous flowers, characters probably associated with autogamy in the small, disjunct populations of M. candelariae.

#### Acknowledgements

We thank James Henrickson for reviewing the manuscript and Marshall C. Johnston for providing the latin diagnosis.

#### Literature Cited

Cronquist, A., A. Holmgren, N. Holmgren, & J. Reveal. 1972. Intermountain Flora Vol. I. Hafner Publishing Company, Inc. New York and London.

Explanation of illustration on opposite page:

Fig. 1. Drawing of the holotype of Mentzelia candelariae. The diagram at lower right shows elements of the whorls of the flower, left to right: sepal, petal, outermost stamen, stamen - - - innermost stamen, style.

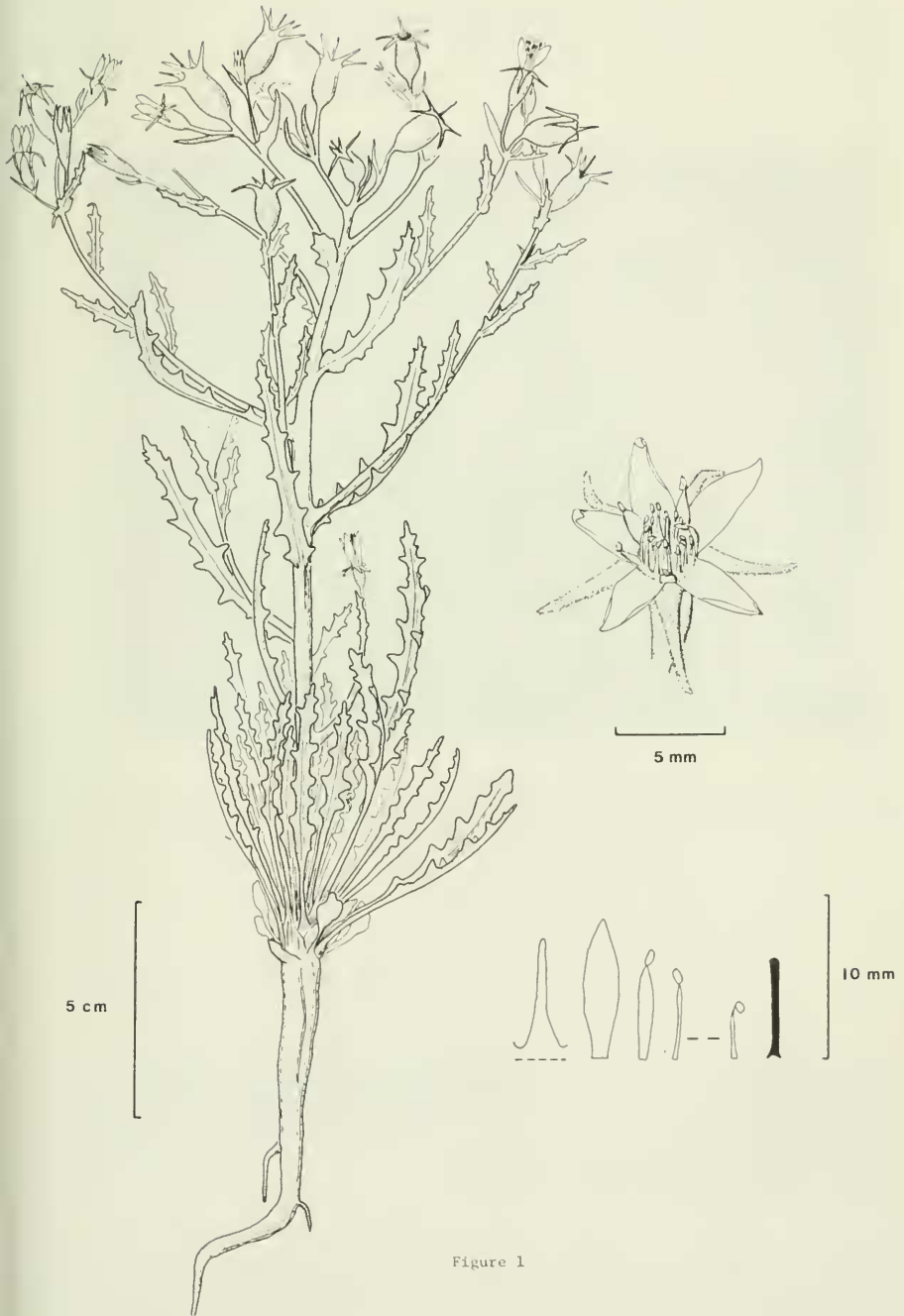


Figure 1

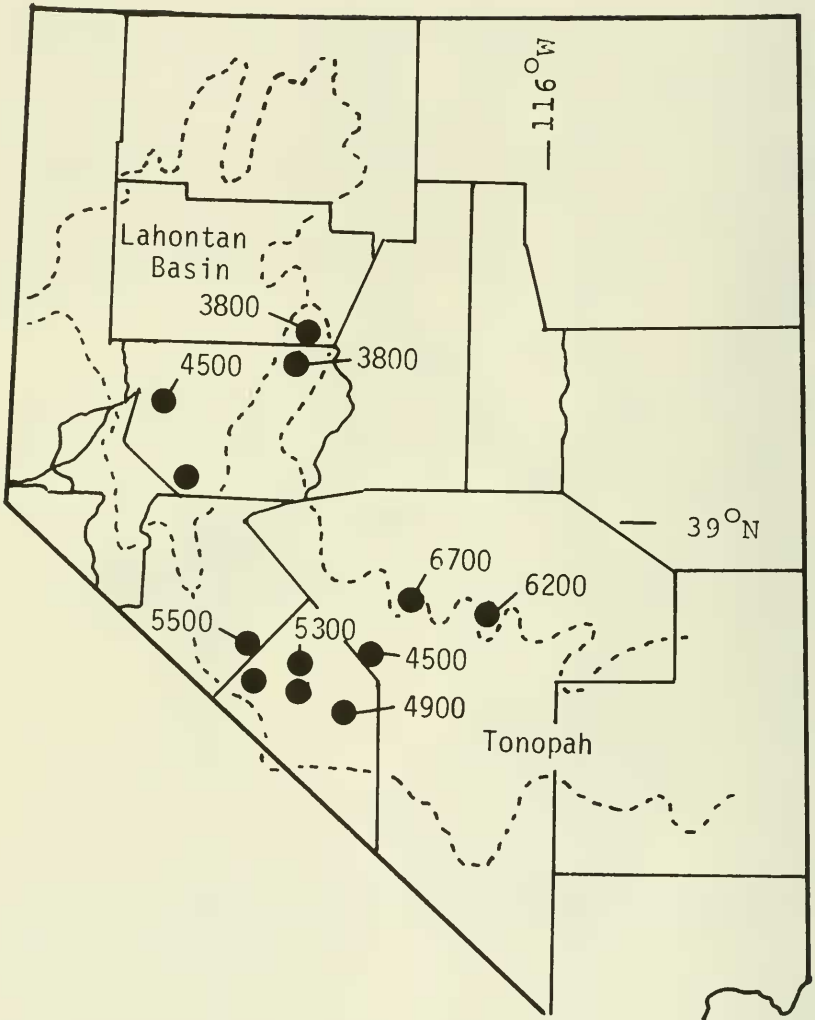


Fig. 2. The state of Nevada, USA, showing the geographical and elevational distribution of *Mentzelia candelararia*. The dotted line shows the limits of the Lahontan Basin and Tonopah Floristic Sections as shown in Cronquist, et al. 1974. Elevations are given in ft because all the collections gave elevations in ft and all the maps in use for this area are in ft.

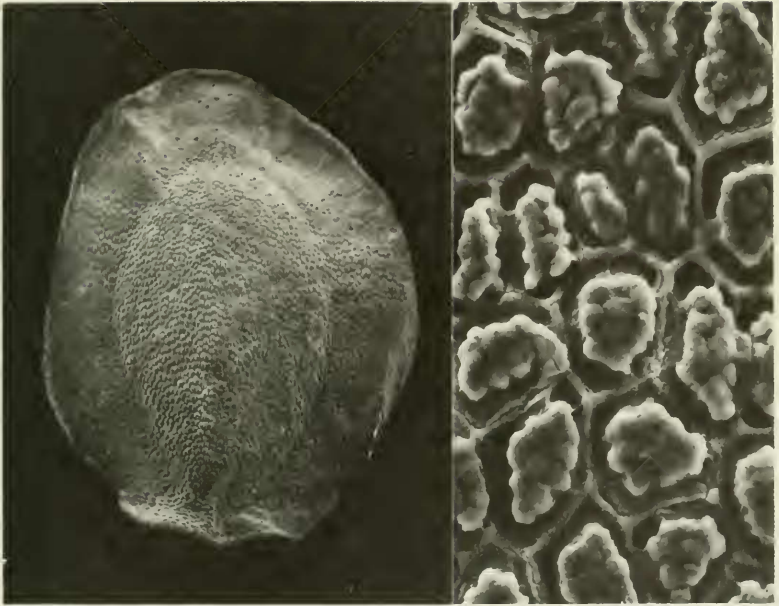


Fig. 3. Scanning electron micrographs of seeds of Mentzelia candulariae. Left: Entire seed from Iiehm 6017. This seed is 3.2 mm long. Right: Seed coat cells of Iiehm 6000, 400X.